

site; if there are three, it is the last alone that is composite. 3. The number of abdominal ganglia varies from one to eight; and the Muscidae Calypteræ have no separated abdominal ganglia, these being confounded with the central nervous part in the thorax. Sometimes the number of abdominal ganglia varies in the same species, according to the sex: according to Landois, *Pulex canis* has eight and seven; according to my own researches this is the case also in *P. felis* and *P. irritans*. I have also found that in the male *Leptis* the last ganglion has a constriction, whilst in the female it is compact. 4. The Diptera have a frontal ganglion and two pairs of small pharyngeal ganglia; but they have not the abdominal part of the sympathetic system distinct.

The nervous system of the Hemiptera has been very little investigated, and comparative studies are wanting. My researches on the nervous system of the Hemiptera extend to seventy species. 1. Some Hemiptera have no separate subœsophageal ganglion, the latter being amalgamated with the medullary part of the thorax. 2. In some (*Pseudophanus*) it is separate, and placed, not in the head, but in the thorax. The convolutions of the cerebroid lobes are never wanting. 3. In some Hemiptera which have two ganglia in the thorax, the first results from the fusion of the first thoracic ganglion with the subœsophageal ganglion. 4. The number of thoracic ganglia varies from one to three: thus *Hydrometra*, *Acanthia*, and *Nepa* have one; two occur in *Pentatoma*, *Lygæus*, &c.; there are three thoracic ganglia in *Pediculus*, but, having no commissures, they are in contact. *Notonecta* presents an intermediate form, having only a single true thoracic ganglion, which, however, possesses a very strongly-marked constriction. 5. The Hemiptera never have separated abdominal ganglia, they being amalgamated with the thoracic part of the nervous system.—*Comptes Rendus*, December 6, 1880, pp. 935-937.

*Habits of a Fish of the Family Siluridæ (Callichthys fasciatus, Cuv.).*

By M. CARBONNIER.

I have in my possession several individuals of the species called *Callichthys fasciatus*, Cuv., coming from the river Plate. This species is characterized by two barbels at each angle of the upper lip, two rows of broad and strong scaly plates, which cover the flanks and intercept the lateral line, and two dorsal fins, of which the second (adipose) is furnished like the first with an osseous ray. These fishes, as I have ascertained, come frequently to take in a provision of air at the surface of the water; but their most interesting peculiarity consists in their mode of copulation and reproduction.

At the moment of fecundation the female brings together her ventral fins, after the fashion of two open fans united by their edges, and thus forms a sort of *cul-de-sac*, at the bottom of which

the aperture of the ovaries opens. The fecundating elements of the male are imprisoned in this sort of membranous sac; and when, a few moments afterwards, the eggs arrive in the same place, they will find themselves bathed in a liquid very rich in spermatozooids.

Each laying consists of five or six eggs, which the female retains for a few minutes in the pouch above described; then she quits the bottom to go in search of a favourable spot for their evolution. Her choice leads her in preference to a well-illuminated part, such as the glass wall of the aquarium, or a stone that emerges from the water; with her mouth she cleans a place situated at least 10–15 centims. below the level of the water, then, applying her abdomen to this place, she opens her sac and attaches the eggs, which adhere by means of the viscosity with which they are endued.

All the eggs being deposited, contact with the male recommences; and the ovipositions thus follow one another forty or fifty times in the course of the day. I estimate the total number of eggs emitted at about two hundred and fifty\*.

At the moment of deposition the eggs, arranged in groups of from three to five, are of a milky white, and but slightly transparent; they afterwards become yellowish, and at the moment of exclusion, *i. e.* from the eighth to the tenth day of incubation, they become blackish: this coloration is due to the pigment spots which cover the body of the embryo.

At the moment of its birth the embryo is globular. At first one can only distinguish the four barbels; the umbilical vesicle, which is semitransparent, is not very voluminous; the embryo holds itself in the normal position, and not lying upon its side, like most embryos of other fishes. Speedily the tail and the other fins appear. These latter developments last on the average three days, during which time these fishes lead an independent and isolated life. When this period is past, *i. e.* from twelve to thirteen days after deposition, all these young fishes collect together and move about the bottom of the aquarium.

The growth of this fish is not very rapid; it does not become adult until two years after its birth.

An interesting fact is the change of the period of reproduction presented by our *Callichthys*. At La Plata it is in the months of October and November that it breeds. After arriving in Europe it passed a year without producing young. In 1878 oviposition took place in August and September. The produce of this generation oviposited this year in the month of June. Evidently there has been an adaptation to our climate, the temperatures of which are the reverse of those of South America.—*Comptes Rendus*, Dec. 6, 1880, p. 940.

\* The layings observed by me always commenced between 9 and 10 o'clock A.M., and terminated about 2 P.M.